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AUTH.NAME	AUTHOR AFFILIATION
WHITE,L.D.	Rochester Gas & Electric Corp.
RECIP.NAME	RECIPIENT AFFILIATION
EISENHUT,D.G.	Division of Operating Reactors

SUBJECT: Forwards response to NRC 800225 request for info re turbine disc integrity in operating Westinghouse low pressure turbines.Application for withholding proprietary info & affidavit encl.Proprietary version withheld (ref 10cfr2790).

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MEMORANDUM FOR: TERA Corp.

FROM: US NRC/TIDC/Distribution Services Branch

SUBJECT: Special Document Handling Requirements

☐ 1. Please use the following special distribution list for the attached document.

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☐ Do not send oversize enclosure to the NRC PDR.

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☒ Proprietary information - send affidavit only to the NRC PDR LTR, NP

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Mike

TIDC/DSB Authorized Signature

cc: DSB Files

RG&E
ROCHESTER GAS AND ELECTRIC CORPORATION • 89 EAST AVENUE, ROCHESTER, N.Y. 14649

LEON D. WHITE, JR.
VICE PRESIDENT

TELEPHONE
AREA CODE 716 546-2700

March 19, 1980

Mr. Darrell G. Eisenhut, Acting Director
Division of Operating Reactors
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Information in Response to NRC Request for Information of February 25, 1980, relative to Low Pressure Turbine Disc Integrity
R. E. Ginna Nuclear Power Plant, Unit No. 1
Docket No. 50-244

Dear Mr. Eisenhut:

Enclosed are:

1. One (1) copy - Application for Withholding and one (1) copy - Affidavit AW-80-3.

2. One (1) copy - Attachment A, Site Specific Question Answers - Including proprietary responses to Question 1-d.

3. One (1) copy - Attachment B, Site Specific Question Answers - Including non-proprietary responses to Question 1-d.

The purpose of this letter is to respond to your request for information of February 25, 1980 relative to turbine disc integrity in operating Westinghouse nuclear low pressure turbines. Per your request in the subject letter, responses to the generic questions have been coordinated through a task force whose representation includes all owners of Westinghouse nuclear low pressure turbines and is chaired by Mr. Wayne Stiede of Commonwealth Edison. The consensus responses to the generic questions have been submitted to you by Westinghouse at the request of the task force. Where we agree with the responses, we have referenced that transmittal in our attached responses.

The site specific responses contain proprietary information of the Westinghouse Electric Corporation. In conformance with the requirements of 10 CFR Section 2.790, as amended, of the Commission's regulations, we

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8003250463

are enclosing with the submittal an application for withholding from public disclosure and an affidavit. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission.

Correspondence with respect to the affidavit or application for withholding should reference AW-80-3 and should be addressed to Mr. R. Williamson, Manager, Customer Order Engineering, Westinghouse Electric Corporation, Steam Turbine Divisions, Lester Branch Box 9175, Philadelphia, Pennsylvania 19113.

Very truly yours,

L D White, Jr.

L. D. White, Jr.

Enclosures

Subscribed and sworn to me

on this 19th day of March 1980.

Gary L Reiss

GARY L. REISS
NOTARY PUBLIC, State of N. Y. Monroe Co.
My Commission Expires March 30, 19 81

DOCKET NO. 50-244

DATE: 80/03/27

NOTE TO NRC AND/OR LOCAL PUBLIC DOCUMENT ROOMS

The following item submitted with letter dated 80/03/19 from Rochester Gas & Elec Corp. is being withheld from public disclosure in accordance with Section 2.790.

PROPRIETARY INFORMATION

Forwards responses for info re turbine disc integrity

Sharon Hunt
M/S-016

Distribution Service's Branch

AW-80-3

March 14, 1980

Darrell G. Eisenhut
Division of Operating Reactors
Office of Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Washington DC 20555

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: R. E. Ginna Nuclear Power Plant Unit 1 Docket #50-244
Information in Response to NRC Request for Information of February 25, 1980, Relative to Low Pressure Turbine Disc Integrity.

Reference: Appendix A letter from Leon D. White, Jr. to Eisenhut, dated 3/19/80

Dear Mr. Eisenhut:

This application for withholding is submitted by Westinghouse Electric Corporation ("Westinghouse") pursuant to the provisions of paragraph (b)(1) of Section 2.790 of the Commission's regulations. Withholding from public disclosure is requested with respect to the subject information which is further identified in the affidavit accompanying this application.

The undersigned has reviewed the information sought to be withheld and is authorized to apply for its withholding on behalf of Westinghouse, STG-TOD.

The affidavit accompanying this application sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse and which is further identified in the affidavit be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations.

Correspondence with respect to this application for withholding or the accompanying affidavit should be addressed to the undersigned.

Very truly yours,

Robert B Williamson

R. Williamson, Manager
Customer Order Engineering
Westinghouse Electric Corporation

Ref: AW-80-3

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF DELAWARE:

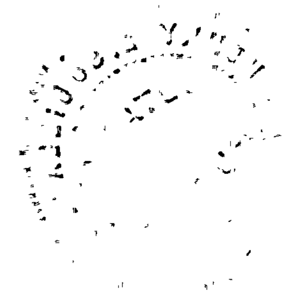
Before me, the undersigned authority, personally appeared Robert Williamson, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Robert B Williamson

Robert Williamson, Manager
Customer Order Engineering

Sworn to and subscribed before me
this 19 day of March 1980

Henry E. Squillace
HENRY E. SQUILLACE
Notary Public, Marple Twp., Delaware Co.
My Commission Expires Oct. 18, 1980



(1) I am Manager, Customer Order Engineering in the Steam Turbine Generator Technical Operations Division of Westinghouse Electric Corporation and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing, and am authorized to apply for its withholding on behalf of the Westinghouse Power Generation Divisions.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse Power Generation Divisions in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(g) It is not the property of Westinghouse, but must be treated as proprietary by Westinghouse according to agreements with the owner.

(h) Public disclosure of this information would allow unfair and untruthful judgments on the performance and reliability of Westinghouse equipment components and improper comparison with similar components made by competitors.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition in those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.790, it is to be received in confidence by the Commission.

(iv) The information is not available in public sources to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in Attachment A to letter from L. D. White, Jr. to Eisenhut, dated March 19, 1980 concerning information in response to NRC request for information of February 25, 1980, relative to low pressure turbine disc integrity.

The information enables Westinghouse to:

(a) Develop test inputs and procedures to satisfactorily verify the design of Westinghouse supplied equipment.

(b) Assist its customers to obtain licenses.

Further, the information has substantial commercial value as follows.

(a) Westinghouse can sell the use of this information to customers.

(b) Westinghouse uses the information to verify the design of equipment which is sold to customers.

(c) Westinghouse can sell services based upon the experience gained and the test equipment and methods developed.

Public disclosure of this information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to design, manufacture, verify, and sell electrical equipment for commercial turbine-generators without commensurate expenses. Also, public disclosure of the information would enable others having the same or similar equipment to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the equipment described in part by the information is the result of many years of development by Westinghouse and the expenditure of a considerable sum of money.

This could only be duplicated by a competitor if he were to invest similar sums of money and provided he had the appropriate talent available and could somehow obtain the requisite experience.

Further the deponent sayeth not.

March 19, 1980
Attachment B

Subject: Information in Response to NRC Request for Information of February 25, 1980, relative to Low Pressure Turbine Disc Integrity Site Specific Question Answers including non-proprietery responses to Question 1-d. R. E. Ginna Nuclear Power Plant, Unit No. 1 Docket No. 50-244.

Site Specific Questions:

I. A. Turbine type:

The Rochester Gas & Electric, Ginna #1 unit consists of one tandem compound four flow, three casings, condensing, 1800 RPM turbine utilizing 40 in. last row blades in each low pressure element. The low pressure element is designated as a Building Block 80.

B. Number of hours of operation for each LP turbine at time of last turbine inspection or if not inspected, postulated to inspection:

The LP-A rotor was used in the LP-1 turbine until February 10, 1979 and has 59,798.5 operating hours. An inspection of this rotor was completed on March 15, 1980.

The LP-B rotor was used in the LP-2 turbine until March 24, 1978, refurbished, and installed in the LP-1 turbine on April 3, 1979. It will have 61,103.25 operating hours when inspected during the 1980 A.I.&O scheduled to begin on March 28, 1980.

The new LP-C rotor was manufactured and installed in the LP-2 turbine on May 21, 1978. It will have 13,748 operating hours by the 1980 A.I.&O and 36,000 predicted operating hours when scheduled for inspection.

C. Number of turbine trips and overspeeds.

The turbine has experienced a total of 140 manual and automatic trips including 15 overspeed trip tests.

D. For each disc:

1. Type of material including material specifications.
2. Tensile properties data.
3. Toughness properties data including Fracture Appearance Transition Temperature and upper energy and temperature.
4. Keyway temperatures.
5. Calculated keyway crack size for turbine time specified in 'B' above.
6. Critical crack size.
7. Ratio of calculated crack to critical crack size.
8. Crack growth rate.
9. Calculated bore and keyway stress at operating design overspeed.
10. Calculated K_{1c} data.
11. Minimum yield strength specified for each disc.

See Appendix I for the answers to these questions.

II. Provide details of the results of any completed inservice inspection of LP turbine rotors, including areas examined, since issuance of an operating license. For each indication detected, provide details of the location of the crack, its orientation, and size:

The inspection of the LP-A rotor was completed on March 15, 1980. This keyway/bore inspection included tangential and radial UT scans performed in the Westinghouse turbine facility in Charlotte, N.C. The undocumented results are that there were no unacceptable ultrasonic examination indications. A final documentation package is expected at a later date.

III. Provide the nominal water chemistry conditions for each LP turbine and describe any condenser inleakages or other significant changes in secondary water chemistry to this point in its operating life. Discuss the occurrence of cracks in any given turbine as related to history of secondary water chemistry in the unit:

Since the start of operation in March of 1970, the steam generator water treatment program for Ginna has been consistent with the various Westinghouse recommended guidelines. The contaminant control limits being maintained are at levels significantly lower than allowed by present guidelines.

From startup until November 1975 - a period of about 45 effective full power (EFP) months, Ginna employed a phosphate treatment control program. The Na/PO_4 molar ratio was utilized as a major control parameter. Until 1972, that ratio was generally maintained in the 2.1 - 2.3 range. After 1972, while continuing to follow Westinghouse recommendations, that maintained ratio range was modified upward to 2.3 - 2.5. Although the phosphate treatment program afforded a buffering protection in the event of condenser inleakage, the industry-wide occurrences of steam generator tube degradation prompted Westinghouse to recommend a change to an All Volatile Treatment (AVT) Program.

For the 22 EFP months occurring between November 1975 and January 1978, Westinghouse AVT specifications were successfully maintained. Chart I, Appendix II, provides typical 1977 blowdown chemistry. Since it was realized that AVT could not provide the ingress protection afforded by the phosphate treatment, it was RG&E management policy to reduce load and plug failed condenser tubes as soon as leakage was detected. Station chemistry personnel felt that with their use of continuous hotwell sodium monitors, inleakage rates as low as 100 cc/min were detectable. In the few incidences of lake water leakages occurring during this period, the rates were typically from 190 to 570 cc/min. At Ginna, increased blowdown was utilized to control the immediate ingress of contaminants while an orderly power reduction was made for repair. In most cases, Ginna was able to maintain AVT specifications even during these incidences of lake water ingress. A major advantage in Ginna's utilization of Lake Ontario water for once-through cooling is that this lake is fresh water with relatively low concentrations of potentially harmful contaminents. For example, seawater ingress would contain approximately 700 times the sodium concentration as that of Lake Ontario water at the same inleakage rate. Chart II, Appendix II, provides typical chemical concentrations in Ginna cooling water.

Since January 1978 (approximately 23 EFP months), Ginna has maintained AVT control specifications while operating a full flow, deep bed condensate polisher system. Typical blowdown chemistry is shown in Chart III, Appendix II. Operation of the polishers have afforded Ginna excellent protection against the immediate effects of lake water inleakage. With effective polisher operation, situations of known ingress have not resulted in any detectable deterioration of Steam Generator water quality. Although the polishers afford protection against ionic ingress, it has remained RG&E policy

to reduce load and plug leaking condenser tubes as soon as detectable.

During the 90 EFP months of Ginna operation, there have been twelve incidences of condenser leak induced power reductions. Although there have been only the twelve events of actual on-line inleakage, approximately 225 condenser tubes are presently plugged. These additional pluggings were preventative in nature and done as the result of extensive inspections made during maintenance and refueling outages. Many of the preventative pluggings were done during the early years of operation as the result of degradation due to vibration and steam erosion. Condenser modifications made in 1972 have minimized those failure modes. The last detectable condenser inleakage situation occurred approximately 16 months ago in September 1978. As previously indicated, full flow condensate polishers have afforded excellent protection in limiting the potentially harmful effects of condenser ingress on secondary water and steam quality.

See Appendix II for Typical chemistry charts.

IV. If your plant has not been inspected, describe your proposed schedule and approach to ensure that turbine cracking does not exist in your turbine:

The LP-A rotor has been inspected at this time.

The LP-B rotor will be inspected during the 1980 A.I.&O scheduled to begin on March 28th.

The LP-C rotor is planned to be inspected during the LP-2 turbine major inspection in 1983 with 36,000 predicted hours.

V. If your plant has been inspected and plans to return or has returned to power with cracks, provide your proposed schedule for the next turbine inspection and the basis for this inspection schedule:

Not applicable.

VI. Indicate whether an analysis and evaluation regarding turbine missiles has been performed for your plant and provided to the staff. If such an analysis and evaluation has been performed and reported, please provide appropriate references to the available documentation. In the event that such studies have not been made, consideration should be given to scheduling such an action:

The potential turbine missile hazard at Ginna has been extensively reviewed during the SEP review of Topic III-4.B, "Turbine Missiles". This review began with an NRC evaluation of the Ginna FSAR (Appendix 14A) and continued with a Ginna site visit of September 6-8, 1978. Following this site visit, the NRC completed a draft topic assessment (memo from D. K. Davis to D. L. Ziemann, SEP Safety Assessment Input - Ginna, 2/17/79). RG&E provided comments to the Staff on 3/16/79 and a revised safety assessment was issued on April 18, 1979 (letter from Dennis L. Ziemann to Leon D. White, Jr., Topic III-4.B "Turbine Missiles"). The conclusion of this assessment was:

"Therefore, we conclude that the overall probability of turbine missiles damaging the Ginna Nuclear Power Plant and leading to consequences in excess of the 10 CFR Part 100 exposure guidelines is acceptably low as specified in the S.R.P. 3.5.1.3 and the S.R.P. 2.2.3.

On the basis of these results, we consider the operation of the Ginna Nuclear Power Plant safe with regard to turbine missiles, and the risk presented by this postulated event similar to that of plants licensed under current criteria. This completes the evaluation for this SEP topic. Since the plant conforms to current licensing criteria, no additional review is required."

Generic Questions:

Questions I through VIII have been answered by Westinghouse's letter of March 14, 1980 signed by J. M. Schmerling in a generic response that was developed by the Westinghouse Turbine Disc Cracking Task Force of which we are a member. Mr. Wayne Stiede of Commonwealth Edison, the Chairman of the Task Force, will also be responding as to the acceptability to the Task Force of the Westinghouse generic response.

Appendix I

Notes on Answers to
Site Specific Question 1.D
Appendix I

1. Type of material is Ni-Cr-Mo-V alloy steel similar to ASTM A-471. The minimum yield strength specified for each disc is given in Section B.

2. Tensile properties data of tests taken from the disc hub are given in Section B. Data obtained from rim material are presented in Section C.

3. Toughness properties are also presented in Sections B and C. As described above, Section B contains hub properties and Section C contains rim properties. Upper shelf energy is not presented when it is the same as the room temperature energy.

4. The keyway temperature is presented in Section G. This the calculated temperature two inches from the exhaust face of the disc at the bore during full load operation with all moisture separator reheaters functioning.

5. The maximum expected keyway crack size has been calculated for each disc on each rotor. This was done by multiplying the crack growth rate by the time each rotor was in operation prior to the disc/bore inspection. For rotors not yet inspected the time used was the expected operating time to when the rotor will be inspected. The crack growth rate is given in Appendix I, Section G, in response to question I.D.8.

6. The critical crack size at 1800 rpm and at design overspeed is presented in Section F. It is calculated using the relationship:

b,c,e

[ ]

7. The rate of calculated crack size (A) to critical crack size (Acr) is the ratio of the results of item 5 of Appendix I to item 6 of Appendix I of this response.

The LP-C rotor disc data was not put in the Westinghouse computer in time for submittal. This data is expected in approximately two weeks.

In order to verify our confidence in the safety of this rotor until the normal inspection outage, Westinghouse assured RG&E that the material and design is identical to LP-A and LP-B and that the parameters for LP-C will be very similar. The worst case critical crack depths from the W data for the discs of LP-A and LP-B were used to determine a preliminary value of A/Acr for the LP-C discs. These values were less than .1 for the present operating hours and less than .21 for the estimated hours to the normal inspection.

When the accurate data is available, the appropriate calculation results will be forwarded to your office.

8. The crack growth rate is given in Section G. These crack growth rates are the maximum expected rates based upon known cracks to date. Westinghouse has changed the basis for determining these rates to utilize the NRC gray book operating hours. The crack growth rate of the number one and six discs of the BB 80 turbines should be assumed to be zero since these discs operate dry under normal operations.

9. The bore tangential stress at 1800 rpm and at design overspeed are presented in Section E. The values presented include the stresses due to shrink fit and centrifugal force loads only.

10. The fracture toughness, K_{IC}, of each disc is calculated from the Charpy v-notch and tensile data. The values, presented in Sections B and C are calculated at the upper shelf temperature or room temperature, whichever gives the lower result.

11. The minimum yield strength specified for each disc is presented in Section B.

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e

1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1800	(KSI)
2. 2160 (120%)	(KSI)

[ ] b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e

1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1800	(KSI)
2. 2160 (120%)	(KSI)

[ ] b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ] b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM) [ ] b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C [ ] b,c,e	MN [ ] b,c,e	SI [ ] b,c,e	P [ ] b,c,e	CR [ ] b,c,e	MO [ ] b,c,e	V [ ] b,c,e
NI [ ] b,c,e	AS [ ] b,c,e	SB [ ] b,c,e	SN [ ] b,c,e	AL [ ] b,c,e	CU [ ] b,c,e	S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA [ ] b,c,e
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.
[ ] b,c,e

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] (KSI)) b,c,e
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))
[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))
[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e	MN [ ] b,c,e	SI [ ] b,c,e	P [ ] b,c,e	CR [ ] b,c,e	MO [ ] b,c,e	V [ ] b,c,e
NI [ ] b,c,e	AS [ ] b,c,e	SB [ ] b,c,e	SN [ ] b,c,e	AL [ ] b,c,e	CU [ ] b,c,e	S [ ] b,c,e

E. BORE STRESS

SPEED (RPM) STRESS
1. 1800 (KSI)
2. 2160 (120%) (KSI)
[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)
[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO
[ ] b,c,e

March 19, 1980

Attachment B Appendix I Sheet 9

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ] b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM) [ ] b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA [ ] b,c,e
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA [ ] b,c,e
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ] b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM) [ ] b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C [ ] b,c,e	MN [ ] b,c,e	SI [ ] b,c,e	P [ ] b,c,e	CR [ ] b,c,e	MO [ ] b,c,e	V [ ] b,c,e
NI [ ] b,c,e	AS [ ] b,c,e	SB [ ] b,c,e	SN [ ] b,c,e	AL [ ] b,c,e	CU [ ] b,c,e	S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA [ ] b,c,e
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA [ ] b,c,e
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[illegible]

ID # : [ ]b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ]b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE
(MIN. Y.S. [ ]b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ]b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM) [ ]b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C [ ]b,c,e MN [ ]b,c,e SI [ ]b,c,e P [ ]b,c,e CR [ ]b,c,e MO [ ]b,c,e V [ ]b,c,e

NI [ ]b,c,e AS [ ]b,c,e SB [ ]b,c,e SN [ ]b,c,e AL [ ]b,c,e CU [ ]b,c,e S [ ]b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ]b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA [ ]b,c,e
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA [ ]b,c,e
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB) b,c,e
1. TYPE (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM) b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1800	(KSI)
2. 2160 (120%)	(KSI)

[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM) STRESS
1. 1800 (KSI)
2. 2160 (120%) (KSI)

[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ] b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM) [ ] b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C [ ] b,c,e	MN [ ] b,c,e	SI [ ] b,c,e	P [ ] b,c,e	CR [ ] b,c,e	MO [ ] b,c,e	V [ ] b,c,e
NI [ ] b,c,e	AS [ ] b,c,e	SB [ ] b,c,e	SN [ ] b,c,e	AL [ ] b,c,e	CU [ ] b,c,e	S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA [ ] b,c,e
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e

1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ]

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ]

D. CHEMISTRY

C b,c,e [ ]	MN b,c,e [ ]	SI b,c,e [ ]	P b,c,e [ ]	CR b,c,e [ ]	MO b,c,e [ ]	V b,c,e [ ]
NI b,c,e [ ]	AS b,c,e [ ]	SB b,c,e [ ]	SN b,c,e [ ]	AL b,c,e [ ]	CU b,c,e [ ]	S b,c,e [ ]

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.) [ ]
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ]

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

[ ] b,c,e

B. MATERIAL PROPERTIES (HUB)

1. TYPE
   (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM) STRESS

1. 1800 (KSI)
2. 2160 (120%) (KSI)

[ ] b,c,e

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e

1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ] b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM) [ ] b,c,e

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C [ ] b,c,e	MN [ ] b,c,e	SI [ ] b,c,e	P [ ] b,c,e	CR [ ] b,c,e	MO [ ] b,c,e	V [ ] b,c,e
NI [ ] b,c,e	AS [ ] b,c,e	SB [ ] b,c,e	SN [ ] b,c,e	AL [ ] b,c,e	CU [ ] b,c,e	S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA [ ] b,c,e

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA [ ] b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e	MN [ ] b,c,e	SI [ ] b,c,e	P [ ] b,c,e	CR [ ] b,c,e	MO [ ] b,c,e	V [ ] b,c,e
NI [ ] b,c,e	AS [ ] b,c,e	SB [ ] b,c,e	SN [ ] b,c,e	AL [ ] b,c,e	CU [ ] b,c,e	S [ ] b,c,e

E. BORE STRESS

SPEED (RPM) STRESS
1. 1800 (KSI)
2. 2160 (120%) (KSI)

[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e

1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ] b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM) [ ] b,c,e

1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA [ ] b,c,e

1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA [ ] b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE
   (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[ ] b,c,e
2. 2160 (120%)	(KSI)	

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.) [ ] b,c,e
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e   MN [ ] b,c,e   SI [ ] b,c,e   P [ ] b,c,e   CR [ ] b,c,e   MO [ ] b,c,e   V [ ] b,c,e

NI [ ] b,c,e   AS [ ] b,c,e   SB [ ] b,c,e   SN [ ] b,c,e   AL [ ] b,c,e   CU [ ] b,c,e   S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1800	(KSI)
2. 2160 (120%)	(KSI)

[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

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ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL [ ] b,c,e
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

C. MATERIAL PROPERTIES (RIM) [ ] b,c,e
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM) STRESS
1. 1800 (KSI) [ ] b,c,e
2. 2160 (120%) (KSI)

F. CRACK DATA [ ] b,c,e
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

G. SERVICE DATA [ ] b,c,e
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

b,c,e

ID # : [ ]

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

[ ]

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] (KSI)) b,c,e
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

b,c,e [ ]

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

b,c,e [ ]

D. CHEMISTRY

C [ ] b,c,e MN [ ] b,c,e SI [ ] b,c,e P [ ] b,c,e CR [ ] b,c,e MO [ ] b,c,e V [ ] b,c,e

NI [ ] b,c,e AS [ ] b,c,e SB [ ] b,c,e SN [ ] b,c,e AL [ ] b,c,e CU [ ] b,c,e S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1800	(KSI)
2. 2160 (120%)	(KSI)

b,c,e [ ]

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

b,c,e [ ]

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

b,c,e [ ]

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b,c,e

ID # : [ ]

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e
1. BUILDING BLOCK [ ]
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO. [ ]

B. MATERIAL PROPERTIES (HUB) b,c,e
1. TYPE
   (MIN. Y.S. [ ] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e
3. Y.S. (KSI) [
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))]

C. MATERIAL PROPERTIES (RIM) b,c,e
1. Y.S. (KSI) [
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))]

D. CHEMISTRY

C b,c,e [ ] MN b,c,e [ ] SI b,c,e [ ] P b,c,e [ ] CR b,c,e [ ] MO b,c,e [ ] V b,c,e [ ]

NI b,c,e [ ] AS b,c,e [ ] SB b,c,e [ ] SN b,c,e [ ] AL b,c,e [ ] CU b,c,e [ ] S b,c,e [ ]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[
2. 2160 (120%)	(KSI)	]

F. CRACK DATA b,c,e
1. A-CR-OP (1800 RPM) (IN.) [
2. A-CR-OS (OVERSPEED) (IN.)]

G. SERVICE DATA b,c,e
1. OPER. TEMP. METAL TEMP. HUB (DEG.F) [
2. ESTIMATED MAX DA/DT (IN/HR)

3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO]

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e	MN [ ] b,c,e	SI [ ] b,c,e	P [ ] b,c,e	CR [ ] b,c,e	MO [ ] b,c,e	V [ ] b,c,e
NI [ ] b,c,e	AS [ ] b,c,e	SB [ ] b,c,e	SN [ ] b,c,e	AL [ ] b,c,e	CU [ ] b,c,e	S [ ] b,c,e

E. BORE STRESS

SPEED (RPM) STRESS
1. 1800 (KSI)
2. 2160 (120%) (KSI)

[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

ID # : [ ] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION [ ] b,c,e
1. BUILDING BLOCK
2. UNIT
3. CUSTOMER:
4. LP#
5. LOCATION
6. DISC#
7. TEST NO.

B. MATERIAL PROPERTIES (HUB)
1. TYPE (MIN. Y.S. [ ] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL
3. Y.S. (KSI)
4. U.T.S. (KSI)
5. ELONGATION
6. R.A.
7. FATT (DEG.F)
8. R.T. IMPACT(FT.LB.)
9. U.S. IMPACT TEMP. (DEG.F)
10. U.S. IMPACT ENG. (FT.LB.)
11. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

C. MATERIAL PROPERTIES (RIM)
1. Y.S. (KSI)
2. U.T.S. (KSI)
3. ELONGATION
4. R.A.
5. FATT (DEG.F)
6. R.T. IMPACT(FT.LB.)
7. U.S. IMPACT TEMP. (DEG.F)
8. U.S. IMPACT ENG. (FT.LB.)
9. U.S. KIC (KSI*SQRT(IN.))

[ ] b,c,e

D. CHEMISTRY

C [ ] b,c,e   MN [ ] b,c,e   SI [ ] b,c,e   P [ ] b,c,e   CR [ ] b,c,e   MO [ ] b,c,e   V [ ] b,c,e

NI [ ] b,c,e   AS [ ] b,c,e   SB [ ] b,c,e   SN [ ] b,c,e   AL [ ] b,c,e   CU [ ] b,c,e   S [ ] b,c,e

E. BORE STRESS

SPEED (RPM)	STRESS
1. 1800	(KSI)
2. 2160 (120%)	(KSI)

[ ] b,c,e

F. CRACK DATA
1. A-CR-OP (1800 RPM) (IN.)
2. A-CR-OS (OVERSPEED) (IN.)

[ ] b,c,e

G. SERVICE DATA
1. OPER. TEMP. METAL TEMP. HUB (DEG.F)
2. ESTIMATED MAX DA/DT (IN/HR)
3. ROTOR OPERATING HOURS
4. CALCULATED CRACK DEPTH
5. CALCULATED A/Acr RATIO

[ ] b,c,e

Appendix II

CHART I

TYPICAL 1977 BLOWDOWN CHEMISTRY

RESULTS	PARAMETER	WESTINGHOUSE CONTROL
0.4-0.7μMHOS	Cation Conductivity	< 2.0μMHOS
1.5-3.5μMHOS	Conductivity	None
(-)0.15-0.05ppm	Free Hydroxide	< .15ppm
< 0.05-0.10ppm	Chloride	None
7-15ppm	Sodium	None
8.6-9.1	Ph	8.5-9.2

CHART II

CONDENSER COOLING WATER CHEMISTRY

PARAMETER	NORMAL RANGE
PH	7.5-9.0
Total Hardness	100-175ppm
Alkalinity	50-125ppm
Silica	0.1-1.0ppm
Sodium Sulfate	20-45ppm
Sodium	10-25ppm
Calcium	30-50ppm
Magnesium	5-10ppm
Chlorides	15-40ppm
Total Solids	150-250ppm
Total Dissolved Solids	150-250ppm
Suspended Solids	5-20ppm

CHART III

TYPICAL 1979 BLOWDOWN CHEMISTRY

RESULTS	PARAMETER	WESTINGHOUSE CONTROL
0.15-0.25μMHOS	Cation Conductivity	< 2.0μMHOS
1.2-1.8	Conductivity	None
(-)0.15-0.05ppm	Free Hydroxide	< .15ppm
0.005-0.015ppm	Chloride	< .15ppm
0.005-0.015ppm	Sodium	< .10ppm
8.5-9.0	PH	8.5-9.2

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March 19, 1980
Attachment A

Subject: Information in response to NRC Request for Information of February 25, 1980, relative to Low Pressure Turbine Disc Integrity Site Specific Question Answers including Proprietary Responses to Question 1-d. R. E. Ginna Nuclear Power Plant, Unit No. 1 Docket No. 50-244.

Site Specific Questions:

I. A. Turbine type:

The Rochester Gas & Electric, Ginna #1 unit consists of one tandem compound four flow, three casings, condensing, 1800 RPM turbine utilizing 40 in. last row blades in each low pressure element. The low pressure element is designated as a Building Block 80.

B. Number of hours of operation for each LP turbine at time of last turbine inspection or if not inspected, postulated to inspection:

The LP-A rotor was used in the LP-1 turbine until February 10, 1979 and has 59,798.5 operating hours. An inspection of this rotor was completed on March 15, 1980.

The LP-B rotor was used in the LP-2 turbine until March 24, 1978, refurbished, and installed in the LP-1 turbine on April 3, 1979. It will have 61,103.25 operating hours when inspected during the 1980 A.I.&O scheduled to begin on March 28, 1980.

The new LP-C rotor was manufactured and installed in the LP-2 turbine on May 21, 1978. It will have 13,748 operating hours by the 1980 A.I.&O and 36,000 predicted operating hours when scheduled for inspection.

C. Number of turbine trips and overspeeds.

The turbine has experienced a total of 140 manual and automatic trips including 15 overspeed trip tests.

D. For each disc:

1. Type of material including material specifications.
2. Tensile properties data.
3. Toughness properties data including Fracture Appearance Transition Temperature and upper energy and temperature.
4. Keyway temperatures.
5. Calculated keyway crack size for turbine time specified in 'B' above.
6. Critical crack size.
7. Ratio of calculated crack to critical crack size.
8. Crack growth rate.
9. Calculated bore and keyway stress at operating design overspeed.
10. Calculated K_{1c} data.
11. Minimum yield strength specified for each disc.

See Appendix I for the answers to these questions.

II. Provide details of the results of any completed inservice inspection of LP turbine rotors, including areas examined, since issuance of an operating license. For each indication detected, provide details of the location of the crack, its orientation, and size:

The inspection of the LP-A rotor was completed on March 15, 1980. This keyway/bore inspection included tangential and radial UT scans performed in the Westinghouse turbine facility in Charlotte, N.C. The undocumented results are that there were no unacceptable ultrasonic examination indications. A final documentation package is expected at a later date.

III. Provide the nominal water chemistry conditions for each LP turbine and describe any condenser inleakages or other significant changes in secondary water chemistry to this point in its operating life. Discuss the occurrence of cracks in any given turbine as related to history of secondary water chemistry in the unit:

Since the start of operation in March of 1970, the steam generator water treatment program for Ginna has been consistent with the various Westinghouse recommended guidelines. The contaminant control limits being maintained are at levels significantly lower than allowed by present guidelines.

From startup until November 1975 - a period of about 45 effective full power (EFP) months, Ginna employed a phosphate treatment control program. The Na/PO_4 molar ratio was utilized as a major control parameter. Until 1972, that ratio was generally maintained in the 2.1 - 2.3 range. After 1972, while continuing to follow Westinghouse recommendations, that maintained ratio range was modified upward to 2.3 - 2.5. Although the phosphate treatment program afforded a buffering protection in the event of condenser inleakage, the industry-wide occurrences of steam generator tube degradation prompted Westinghouse to recommend a change to an All Volatile Treatment (AVT) Program.

For the 22 EFP months occurring between November 1975 and January 1978, Westinghouse AVT specifications were successfully maintained. Chart I, Appendix II, provides typical 1977 blowdown chemistry. Since it was realized that AVT could not provide the ingress protection afforded by the phosphate treatment, it was RG&E management policy to reduce load and plug failed condenser tubes as soon as leakage was detected. Station chemistry personnel felt that with their use of continuous hotwell sodium monitors, inleakage rates as low as 100 cc/min were detectable. In the few incidences of lake water leakages occurring during this period, the rates were typically from 190 to 570 cc/min. At Ginna, increased blowdown was utilized to control the immediate ingress of contaminants while an orderly power reduction was made for repair. In most cases, Ginna was able to maintain AVT specifications even during these incidences of lake water ingress. A major advantage in Ginna's utilization of Lake Ontario water for once-through cooling is that this lake is fresh water with relatively low concentrations of potentially harmful contaminents. For example, seawater ingress would contain approximately 700 times the sodium concentration as that of Lake Ontario water at the same inleakage rate. Chart II, Appendix II, provides typical chemical concentrations in Ginna cooling water.

Since January 1978 (approximately 23 EFP months), Ginna has maintained AVT control specifications while operating a full flow, deep bed condensate polisher system. Typical blowdown chemistry is shown in Chart III, Appendix II. Operation of the polishers have afforded Ginna excellent protection against the immediate effects of lake water inleakage. With effective polisher operation, situations of known ingress have not resulted in any detectable deterioration of Steam Generator water quality. Although the polishers afford protection against ionic ingress, it has remained RG&E policy

to reduce load and plug leaking condenser tubes as soon as detectable.

During the 90 EFP months of Ginna operation, there have been twelve incidences of condenser leak induced power reductions. Although there have been only the twelve events of actual on-line inleakage, approximately 225 condenser tubes are presently plugged. These additional pluggings were preventative in nature and done as the result of extensive inspections made during maintenance and refueling outages. Many of the preventative pluggings were done during the early years of operation as the result of degradation due to vibration and steam erosion. Condenser modifications made in 1972 have minimized those failure modes. The last detectable condenser inleakage situation occurred approximately 16 months ago in September 1978. As previously indicated, full flow condensate polishers have afforded excellent protection in limiting the potentially harmful effects of condenser ingress on secondary water and steam quality.

See Appendix II for Typical chemistry charts.

IV. If your plant has not been inspected, describe your proposed schedule and approach to ensure that turbine cracking does not exist in your turbine:

The LP-A rotor has been inspected at this time.

The LP-B rotor will be inspected during the 1980 A.I.&O scheduled to begin on March 28th.

The LP-C rotor is planned to be inspected during the LP-2 turbine major inspection in 1983 with 36,000 predicted hours.

V. If your plant has been inspected and plans to return or has returned to power with cracks, provide your proposed schedule for the next turbine inspection and the basis for this inspection schedule:

Not applicable.

VI. Indicate whether an analysis and evaluation regarding turbine missiles has been performed for your plant and provided to the staff. If such an analysis and evaluation has been performed and reported, please provide appropriate references to the available documentation. In the event that such studies have not been made, consideration should be given to scheduling such an action:

The potential turbine missile hazard at Ginna has been extensively reviewed during the SEP review of Topic III-4.B, "Turbine Missiles". This review began with an NRC evaluation of the Ginna FSAR (Appendix 14A) and continued with a Ginna site visit of September 6-8, 1978. Following this site visit, the NRC completed a draft topic assessment (memo from D. K. Davis to D. L. Ziemann, SEP Safety Assessment Input - Ginna, 2/17/79). RG&E provided comments to the Staff on 3/16/79 and a revised safety assessment was issued on April 18, 1979 (letter from Dennis L. Ziemann to Leon D. White, Jr., Topic III-4.B "Turbine Missiles"). The conclusion of this assessment was:

"Therefore, we conclude that the overall probability of turbine missiles damaging the Ginna Nuclear Power Plant and leading to consequences in excess of the 10 CFR Part 100 exposure guidelines is acceptably low as specified in the S.R.P. 3.5.1.3 and the S.R.P. 2.2.3.

On the basis of these results, we consider the operation of the Ginna Nuclear Power Plant safe with regard to turbine missiles, and the risk presented by this postulated event similar to that of plants licensed under current criteria. This completes the evaluation for this SEP topic. Since the plant conforms to current licensing criteria, no additional review is required."

Generic Questions:

Questions I through VIII have been answered by Westinghouse's letter of March 14, 1980 signed by J. M. Schmerling in a generic response that was developed by the Westinghouse Turbine Disc Cracking Task Force of which we are a member. Mr. Wayne Stiede of Commonwealth Edison, the Chairman of the Task Force, will also be responding as to the acceptability to the Task Force of the Westinghouse generic response.

Appendix I

Notes on Answers to
Site Specific Question 1.D
Appendix I

1. Type of material is Ni-Cr-Mo-V alloy steel similar to ASTM A-471. The minimum yield strength specified for each disc is given in Section B.

2. Tensile properties data of tests taken from the disc hub are given in Section B. Data obtained from rim material are presented in Section C.

3. Toughness properties are also presented in Sections B and C. As described above, Section B contains hub properties and Section C contains rim properties. Upper shelf energy is not presented when it is the same as the room temperature energy.

4. The keyway temperature is presented in Section G. This the calculated temperature two inches from the exhaust face of the disc at the bore during full load operation with all moisture separator reheaters functioning.

5. The maximum expected keyway crack size has been calculated for each disc on each rotor. This was done by multiplying the crack growth rate by the time each rotor was in operation prior to the disc/bore inspection. For rotors not yet inspected the time used was the expected operating time to when the rotor will be inspected. The crack growth rate is given in Appendix I, Section G, in response to question I.D.8.

6. The critical crack size at 1800 rpm and at design overspeed is presented in Section F. It is calculated using the relationship:

b, c, e

$$A_{CR}\,(eff) = \frac{Q}{1.21}\left(\frac{K_{IC}}{\sigma_{BORE}}\right)^2 - R$$

Where K_{IC} is the lower of either the room temperature or upper shelf fracture toughness. σ_{BORE} is the bore stress given in Section E in answer to I.D.9. Q is the shape factor based upon an A:2C ratio of 1:4. This is a change from previous Westinghouse calculations where a 1:10 ratio was conservatively applied. The 1:4 ratio is supported by observed keyway crack geometrics, and agrees with the ratio we believe the U.S. Nuclear Regulatory Commission uses for their analyses. R is the radius of the keyway. Q = 1.35 R = .375"

7. The rate of calculated crack size (A) to critical crack size (Acr) is the ratio of the results of item 5 of Appendix I to item 6 of Appendix I of this response.

   The LP-C rotor disc data was not put in the Westinghouse computer in time for submittal. This data is expected in approximately two weeks.

   In order to verify our confidence in the safety of this rotor until the normal inspection outage, Westinghouse assured RG&E that the material and design is identical to LP-A and LP-B and that the parameters for LP-C will be very similar. The worst case critical crack depths from the W data for the discs of LP-A and LP-B were used to determine a preliminary value of A/Acr for the LP-C discs. These values were less than .1 for the present operating hours and less than .21 for the estimated hours to the normal inspection.

   When the accurate data is available, the appropriate calculation results will be forwarded to your office.

8. The crack growth rate is given in Section G. These crack growth rates are the maximum expected rates based upon known cracks to date. Westinghouse has changed the basis for determining these rates to utilize the NRC gray book operating hours. The crack growth rate of the number one and six discs of the BB 80 turbines should be assumed to be zero since these discs operate dry under normal operations.

9. The bore tangential stress at 1800 rpm and at design overspeed are presented in Section E. The values presented include the stresses due to shrink fit and centrifugal force loads only.

10. The fracture toughness, K_{IC}, of each disc is calculated from the Charpy v-notch and tensile data. The values, presented in Sections B and C are calculated at the upper shelf temperature or room temperature, whichever gives the lower result.

11. The minimum yield strength specified for each disc is presented in Section B.

ID # : [DC 0101001] b,c,e

LP TURBINE DISC INFORMATION

b,c,e

A. UNIT IDENTIFICATION

1. BUILDING BLOCK — 80
2. UNIT — GINNA #1
3. CUSTOMER: — ROCHESTER GCE
4. LP# — 1
5. LOCATION — GOV
6. DISC# — 1
7. TEST NO. — T020803

B. MATERIAL PROPERTIES (HUB)

1. TYPE — VO
   (MIN. Y.S. [150.0] b,c,e (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL

b,c,e

3.	Y.S. (KSI)	152.500
4.	U.T.S. (KSI)	168.000
5.	ELONGATION	16.5
6.	R.A.	54.7
7.	FATT (DEG.F)	-120.0
8.	R.T. IMPACT(FT.LB.)	49.0
9.	U.S. IMPACT TEMP. (DEG.F)	75.0
10.	U.S. IMPACT ENG. (FT.LB.)	49.0
11.	U.S. KIC (KSI*SQRT(IN.))	177.62

C. MATERIAL PROPERTIES (RIM)

b,c,e.

1.	Y.S. (KSI)	129.000
2.	U.T.S. (KSI)	141.500
3.	ELONGATION	19.2
4.	R.A.	61.1
5.	FATT (DEG.F)	-120.0
6.	R.T. IMPACT(FT.LB.)	72.5
7.	U.S. IMPACT TEMP. (DEG.F)	0.0
8.	U.S. IMPACT ENG. (FT.LB.)	49.0
9.	U.S. KIC (KSI*SQRT(IN.))	165.66

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[.28] b,c,e	[.29] b,c,e	[.27] b,c,e	[.008] b,c,e	[1.79] b,c,e	[.47] b,c,e	[.12] b,c,e

NI	AS	SB	SN	AL	CU	S
[3.67] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[.006] b,c,e

E. BORE STRESS

b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	50.000
2. 2160 (120%)	(KSI)	56.300

F. CRACK DATA

b,c,e

1. A-CR-OP (1800 RPM) (IN.) — 4.10
2. A-CR-OS (OVERSPEED) (IN.) — 3.15

G. SERVICE DATA

b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F) — 378
2. ESTIMATED MAX DA/DT (IN/HR) — .280-003
3. ROTOR OPERATING HOURS — 59,798.5
4. CALCULATED CRACK DEPTH — zero
5. A/Acr RATIO — 0/3.15

ID # : [DC:0101001] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION (b,c,e)

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GOV
6. DISC#	2
7. TEST NO.	TDI5003

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] (KSI)) b,c,e TD
2. SUPPLIER: MIDVALE HEPPENSTALL

b,c,e

3. Y.S. (KSI)	127.500
4. U.T.S. (KSI)	137.500
5. ELONGATION	18.4
6. R.A.	58.3
7. FATT (DEG.F)	-100.0
8. R.T. IMPACT(FT.LB.)	80.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	80.5
11. U.S. KIC (KSI*SQRT(IN.))	217.38

C. MATERIAL PROPERTIES (RIM)

b,c,e

1. Y.S. (KSI)	120.0
2. U.T.S. (KSI)	132.0
3. ELONGATION	21.
4. R.A.	69
5. FATT (DEG.F)	-100.
6. R.T. IMPACT(FT.LB.)	72.
7. U.S. IMPACT TEMP. (DEG.F)	-50.
8. U.S. IMPACT ENG. (FT.LB.)	72.
9. U.S. KIC (KSI*SQRT(IN.))	199.7

D. CHEMISTRY

(each value bracketed, marked b,c,e)

C	MN	SI	P	CR	MO	V
.21	.27	.17	.010	1.74	.45	.12

NI	AS	SB	SN	AL	CU	S
4.07						.008

E. BORE STRESS

b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	52.900
2. 2160 (120%)	(KSI)	60.000

F. CRACK DATA

b,c,e

1. A-CR-OP (1800 RPM) (IN.)	5.62
2. A-CR-OS (OVERSPEED) (IN.)	4.28

G. SERVICE DATA

b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	274
2. ESTIMATED MAX DA/DT (IN/HR)	.190-004
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	1.136"
5. Calculated A/Acr RATIO	.265

b,c,e

ID # : [0080101001]

LP TURBINE DISC INFORMATION

b,c,e

A. UNIT IDENTIFICATION

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GOV
6. DISC#	3
7. TEST NO.	TD14996

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TO
(MIN. Y.S. [110.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	121.500
4. U.T.S. (KSI)	135.000
5. ELONGATION	19.0
6. R.A.	58.6
7. FATT (DEG.F)	-120.0
8. R.T. IMPACT(FT.LB.)	67.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	67.0
11. U.S. KIC (KSI*SQRT(IN.))	192.38

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	121.500
2. U.T.S. (KSI)	135.000
3. ELONGATION	19.0
4. R.A.	58.6
5. FATT (DEG.F)	-120.0
6. R.T. IMPACT(FT.LB.)	70.5
7. U.S. IMPACT TEMP. (DEG.F)	0.0
8. U.S. IMPACT ENG. (FT.LB.)	70.5
9. U.S. KIC (KSI*SQRT(IN.))	197.83

D. CHEMISTRY (b,c,e)

C	MN	SI	P	CR	MO	V
[.25]	[.24]	[.17]	[.009]	[1.58]	[.43]	[.11]

NI	AS	SB	SN	AL	CU	S
[3.4]	[ ]	[ ]	[ ]	[ ]	[ ]	[.011]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	52.400
2. 2160 (120%)	(KSI)	59.700

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	4.41
2. A-CR-OS (OVERSPEED) (IN.)	3.31

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	223
2. ESTIMATED MAX DA/DT (IN/HR)	.673-005
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	.403"
5. Calculated A/Acr RATIO	.121

ID # = [D080101001] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	[80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER GCE
4. LP#	1
5. LOCATION	GOV
6. DISC #	4
7. TEST NO.	TD15006]

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE [TC]
   (MIN. Y.S. [100.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	[118.500
4. U.T.S. (KSI)	133.000
5. ELONGATION	19.6
6. R.A.	61.6
7. FATT (DEG.F)	-95.0
8. R.T. IMPACT(FT.LB.)	76.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	76.5
11. U.S. KIC (KSI*SQRT(IN.))	204.49]

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	[118.000
2. U.T.S. (KSI)	132.000
3. ELONGATION	21.2
4. R.A.	67.0
5. FATT (DEG.F)	-95.0
6. R.T. IMPACT(FT.LB.)	98.0
7. U.S. IMPACT TEMP. (DEG.F)	0.0
8. U.S. IMPACT ENG. (FT.LB.)	98.0
9. U.S. KIC (KSI*SQRT(IN.))	233.1]

D. CHEMISTRY (each value bracketed, b,c,e)

C	MN	SI	P	CR	MO	V
[.26]	[.28]	[.32]	[.008]	[1.54]	[.43]	[.12]

NI	AS	SB	SN	AL	CU	S
[3.6]	[ ]	[ ]	[ ]	[ ]	[ ]	[.007]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	[49.600
2. 2160 (120%)	(KSI)	58.200]

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	[5.66
2. A-CR-OS (OVERSPEED) (IN.)	4.00]

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	[188
2. ESTIMATED MAX DA/DT (IN/HR)	.300-005
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	.1794
5. CALCULATED A/Acr RATIO	.0448]

b,c,e

ID # : [D080101001]

LP TURBINE DISC INFORMATION

b,c,e

A. UNIT IDENTIFICATION

1. BUILDING BLOCK		80
2. UNIT	GINNA #1	
3. CUSTOMER:	ROCHESTER G&E	
4. LP#		1
5. LOCATION		GOV
6. DISC#		5
7. TEST NO.	TD5321	

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TB
   (MIN. Y.S. [90.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	98.500
4. U.T.S. (KSI)	116.500
5. ELONGATION	20.4
6. R.A.	49.2
7. FATT (DEG.F)	-87.5
8. R.T. IMPACT(FT.LB.)	74.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	74.5
11. U.S. KIC (KSI*SQRT(IN.))	185.11

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	101.000
2. U.T.S. (KSI)	117.000
3. ELONGATION	23.[illegible]
4. R.A.	70.[illegible]
5. FATT (DEG.F)	-87.[illegible]
6. R.T. IMPACT(FT.LB.)	96.[illegible]
7. U.S. IMPACT TEMP. (DEG.F)	0.[illegible]
8. U.S. IMPACT ENG. (FT.LB.)	96.[illegible]
9. U.S. KIC (KSI*SQRT(IN.))	214.3[illegible]

D. CHEMISTRY b,c,e

C	MN	SI	P	CR	MO	V
[.26]	[.31]	[.24]	[.010]	[1.66]	[.40]	[.13]

NI	AS	SB	SN	AL	CU	S
[3.44]	[ ]	[ ]	[ ]	[ ]	[ ]	[.007]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	50.500
2. 2160 (120%)	(KSI)	58.400

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	4.39
2. A-CR-OS (OVERSPEED) (IN.)	3.12

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	178
2. ESTIMATED MAX DA/DT (IN/HR)	.234-005
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	.1399"
5. CALCULATED A/Acr RATIO	.0438

b,c,e

ID # : [D080101001]

LP TURBINE DISC INFORMATION

b,c,e

A. UNIT IDENTIFICATION

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GOV
6. DISC#	6
7. TEST NO.	TD14988

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TB
(MIN. Y.S. [90.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL

b,c,e

3. Y.S. (KSI)	104.500
4. U.T.S. (KSI)	121.500
5. ELONGATION	21.0
6. R.A.	58.1
7. FATT (DEG.F)	-102.5
8. R.T. IMPACT(FT.LB.)	82.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	82.0
11. U.S. KIC (KSI*SQRT(IN.))	200.29

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	103.000
2. U.T.S. (KSI)	120.000
3. ELONGATION	22.2
4. R.A.	67.9
5. FATT (DEG.F)	-102.5
6. R.T. IMPACT(FT.LB.)	69.0
7. U.S. IMPACT TEMP. (DEG.F)	-50.0
8. U.S. IMPACT ENG. (FT.LB.)	69.0
9. U.S. KIC (KSI*SQRT(IN.))	181.34

D. CHEMISTRY (each bracket marked b,c,e)

C	MN	SI	P	CR	MO	V
[.27]	[.24]	[.15]	[.009]	[1.67]	[.45]	[.12]

NI	AS	SB	SN	AL	CU	S
[3.48]	[ ]	[ ]	[ ]	[ ]	[ ]	[.008]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	43.500
2. 2160 (120%)	(KSI)	49.500

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	7.15
2. A-CR-OS (OVERSPEED) (IN.)	5.43

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	203
2. ESTIMATED MAX DA/DT (IN/HR)	.429-005
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	zero
5. CALCULATED A/Acr RATIO	0/5.43

ID # : [D080101002] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GEN
6. DISC#	1
7. TEST NO.	TD20832

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TC (MIN. Y.S. [100.0] (KSI))	
2. SUPPLIER: BETHLEHEM STEEL	
3. Y.S. (KSI)	107.000
4. U.T.S. (KSI)	129.500
5. ELONGATION	22.0
6. R.A.	64.2
7. FATT (DEG.F)	-90.0
8. R.T. IMPACT(FT.LB.)	89.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	89.0
11. U.S. KIC (KSI*SQRT(IN.))	211.55

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	106.00[illegible]
2. U.T.S. (KSI)	123.50[illegible]
3. ELONGATION	22.[illegible]
4. R.A.	69.[illegible]
5. FATT (DEG.F)	-90.[illegible]
6. R.T. IMPACT(FT.LB.)	89.0
7. U.S. IMPACT TEMP. (DEG.F)	75.0
8. U.S. IMPACT ENG. (FT.LB.)	89.0
9. U.S. KIC (KSI*SQRT(IN.))	210.[illegible]2

D. CHEMISTRY b,c,e

C	MN	SI	P	CR	MO	V
[.26]	[.29]	[.19]	[.010]	[1.89]	[.50]	[.08]

NI	AS	SB	SN	AL	CU	S
[3.74]	[ ]	[ ]	[ ]	[ ]	[ ]	[.012]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. [illegible]00	(KSI)	50.000
2. [illegible]160 (120%)	(KSI)	56.300

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	5.98
2. A-CR-OS (OVERSPEED) (IN.)	4.63

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	378
2. ESTIMATED MAX DA/DT (IN/HR)	.1075-003
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	zero
5. CALCULATED A/Acr RATIO	0/4.63

ID # : [D080101002] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GEN
6. DISC#	2
7. TEST NO.	TD5002

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TD (MIN. Y.S. [110.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	122.500
4. U.T.S. (KSI)	136.000
5. ELONGATION	20.2
6. R.A.	67.7
7. FATT (DEG.F)	-88.0
8. R.T. IMPACT(FT.LB.)	80.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	80.5
11. U.S. KIC (KSI*SQRT(IN.))	213.44

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	121.00
2. U.T.S. (KSI)	137.00
3. ELONGATION	21.0
4. R.A.	67.0
5. FATT (DEG.F)	-88.0
6. R.T. IMPACT(FT.LB.)	84.0
7. U.S. IMPACT TEMP. (DEG.F)	0.0
8. U.S. IMPACT ENG. (FT.LB.)	84.0
9. U.S. KIC (KSI*SQRT(IN.))	217.1

D. CHEMISTRY b,c,e

C	MN	SI	P	CR	MO	V
.21	.27	.17	.010	1.74	.45	.12

NI	AS	SB	SN	AL	CU	S
4.07						.008

E. BORE STRESS b,c,e

SPEED (RPM)		STRESS
1. 1800	(KSI)	52.900
2. 2160 (120%)	(KSI)	60.000

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	5.40
2. A-CR-OS (OVERSPEED) (IN.)	4.11

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	274
2. ESTIMATED MAX DA/DT (IN/HR)	.190-004
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	1.136"
5. CALCULATED A/Acr RATIO	.276

ID # : [I080101002] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GEN
6. DISC#	3
7. TEST NO.	TD29800

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] (KSI)) TD b,c,e
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	114.500
4. U.T.S. (KSI)	132.000
5. ELONGATION	21.0
6. R.A.	65.4
7. FATT (DEG.F)	-120.0
8. R.T. IMPACT(FT.LB.)	74.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	74.5
11. U.S. KIC (KSI*SQRT(IN.))	198.43

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	114.50
2. U.T.S. (KSI)	132.00
3. ELONGATION	21.
4. R.A.	66.
5. FATT (DEG.F)	-120.
6. R.T. IMPACT(FT.LB.)	76.
7. U.S. IMPACT TEMP. (DEG.F)	0.
8. U.S. IMPACT ENG. (FT.LB.)	76.
9. U.S. KIC (KSI*SQRT(IN.))	201.2

D. CHEMISTRY b,c,e

C	MN	SI	P	CR	MO	V
.25	.30	.025	.008	.65	.40	.12

NI	AS	SB	SN	AL	CU	S
3.561						.010

E. BORE STRESS b,c,e

SPEED (RPM)		STRESS
1. 1800	(KSI)	52.400
2. 2160 (120%)	(KSI)	59.700

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	4.71
2. A-CR-OS (OVERSPEED) (IN.)	3.54

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	223
2. ESTIMATED MAX DA/DT (IN/HR)	.673-005
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	.4024"
5. CALCULATED A/Acr RATIO	.114

b,c,e

ID # : [.080101002]

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

b,c,e

1. BUILDING BLOCK	80
2. UNIT:	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GEN
6. DISC#	4
7. TEST NO.	TD15005

B. MATERIAL PROPERTIES (HUB)

1. TYPE b,c,e TC
   (MIN. Y.S. [100.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL

b,c,e

3. Y.S. (KSI)	122.000
4. U.T.S. (KSI)	134.000
5. ELONGATION	21.2
6. R.A.	63.8
7. FATT (DEG.F)	-107.5
8. R.T. IMPACT(FT.LB.)	70.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	70.5
11. U.S. KIC (KSI*SQRT(IN.))	198.20

C. MATERIAL PROPERTIES (RIM)

b,c,e

1. Y.S. (KSI)	120.000
2. U.T.S. (KSI)	132.5[illegible]
3. ELONGATION	21.[illegible]
4. R.A.	68.[illegible]
5. FATT (DEG.F)	-107.[illegible]
6. R.T. IMPACT(FT.LB.)	82.[illegible]
7. U.S. IMPACT TEMP. (DEG.F)	-75.[illegible]
8. U.S. IMPACT ENG. (FT.LB.)	82.[illegible]
9. U.S. KIC (KSI*SQRT(IN.))	213.5[illegible]

D. CHEMISTRY

(b,c,e beside each element)

C	MN	SI	P	CR	MO	V
[.25]	[.28]	[.32]	[.008]	[1.54]	[.43]	[.12]

NI	AS	SB	SN	AL	CU	S
[3.60]	[ ]	[ ]	[ ]	[ ]	[ ]	[.007]

E. BORE STRESS

b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	49.600
2. 2160 (120%)	(KSI)	58.200

F. CRACK DATA

b,c,e

1. A-CR-OP (1800 RPM) (IN.)	5.29
2. A-CR-OS (OVERSPEED) (IN.)	3.74

G. SERVICE DATA

b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	188
2. ESTIMATED MAX DA/DT (IN/HR)	.300-005
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	.1793"
5. CALCULATED A/Acr RATIO	.048

b,c,e

ID # : [0030101002]

LP TURBINE DISC INFORMATION

b,c,e

A. UNIT IDENTIFICATION

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GEN
6. DISC#	5
7. TEST NO.	TD14994

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE (MIN. Y.S. [100.0] (KSI))	TC
2. SUPPLIER:	MIDVALE HEPPENSTALL
3. Y.S. (KSI)	112.500
4. U.T.S. (KSI)	127.500
5. ELONGATION	20.6
6. R.A.	62.1
7. FATT (DEG.F)	-110.0
8. R.T. IMPACT(FT.LB.)	70.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	70.5
11. U.S. KIC (KSI*SQRT(IN.))	191.03

b,c,e

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	112.500
2. U.T.S. (KSI)	128.000
3. ELONGATION	21.8
4. R.A.	65.9
5. FATT (DEG.F)	-110.0
6. R.T. IMPACT(FT.LB.)	74.5
7. U.S. IMPACT TEMP. (DEG.F)	-75.0
8. U.S. IMPACT ENG. (FT.LB.)	74.5
9. U.S. KIC (KSI*SQRT(IN.))	196.83

D. CHEMISTRY (each bracket marked b,c,e)

C	MN	SI	P	CR	MO	V
.29	.29	.10	.008	1.66	.44	.12

NI	AS	SB	SN	AL	CU	S
3.23						.008

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	50.500
2. 2160 (120%)	(KSI)	58.400

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	4.70
2. A-CR-OS (OVERSPEED) (IN.)	3.42

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	178
2. ESTIMATED MAX DA/DT (IN/HR)	.234-005
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	.1399"
5. CALCULATED A/Acr RATIO	.0409

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ID # : [G 80101002] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	1
5. LOCATION	GEN
6. DISC	6
7. TEST NO.	TD5355

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE (MIN. Y.S. [90.0] (KSI))	TB
2. SUPPLIER:	MIDVALE HEPPENSTALL
3. Y.S. (KSI)	91.500
4. U.T.S. (KSI)	109.500
5. ELONGATION	24.2
6. R.A.	69.3
7. FATT (DEG.F)	-120.0
8. R.T. IMPACT(FT.LB.)	127.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	127.5
11. U.S. KIC (KSI*SQRT(IN.))	237.15

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	91.000
2. U.T.S. (KSI)	110.000
3. ELONGATION	24.8
4. R.A.	71.5
5. FATT (DEG.F)	-120.0
6. R.T. IMPACT(FT.LB.)	139.0
7. U.S. IMPACT TEMP. (DEG.F)	0.0
8. U.S. IMPACT ENG. (FT.LB.)	139.0
9. U.S. KIC (KSI*SQRT(IN.))	247.34

D. CHEMISTRY b,c,e

C	MN	SI	P	CR	MO	V
[.27]	[.34]	[.21]	[.008]	[1.76]	[.45]	[.14]
NI	**AS**	**SB**	**SN**	**AL**	**CU**	**S**
[3.40]	[ ]	[ ]	[ ]	[ ]	[ ]	[.007]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	43.500
2. 2160 (120%)	(KSI)	49.500

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	10.17
2. A-CR-OS (OVERSPEED) (IN.)	7.77

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	203
2. ESTIMATED MAX DA/DT (IN/HR)	.429-005
3. ROTOR OPERATING HOURS	59,798.5
4. CALCULATED CRACK DEPTH	zero
5. CALCULATED A/Acr RATIO	0/7.77

ID # : [.080101003] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GOV
6. DISC #	1
7. TEST NO.	TD20831

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE (MIN. Y.S. [100.0] (KSI))	TC
2. SUPPLIER:	BETHLEHEM STEEL
3. Y.S. (KSI)	108.000
4. U.T.S. (KSI)	127.000
5. ELONGATION	20.5
6. R.A.	60.6
7. FATT (DEG.F)	-95.0
8. R.T. IMPACT(FT.LB.)	94.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	94.0
11. U.S. KIC (KSI*SQRT(IN.))	218.73

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	104.5[illegible]
2. U.T.S. (KSI)	123.50[illegible]
3. ELONGATION	22.[illegible]
4. R.A.	68.[illegible]
5. FATT (DEG.F)	-95.[illegible]
6. R.T. IMPACT(FT.LB.)	94.[illegible]
7. U.S. IMPACT TEMP. (DEG.F)	75.[illegible]
8. U.S. IMPACT ENG. (FT.LB.)	94.0
9. U.S. KIC (KSI*SQRT(IN.))	215.[illegible]

D. CHEMISTRY b,c,e

C	MN	SI	P	CR	MO	V
[.26]	[.29]	[.19]	[.010]	[1.89]	[.50]	[.08]

NI	AS	SB	SN	AL	CU	S
[3.74]	[ ]	[ ]	[ ]	[ ]	[ ]	[.012]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	50.000
2. 2160 (120%)	(KSI)	56.300

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	6.42
2. A-CR-OS (OVERSPEED) (IN.)	4.98

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	378
2. ESTIMATED MAX DA/DT (IN/HR)	.1075-003
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	zero
5. CALCULATED A/Acr RATIO	0/4.98

b,c,e

ID # : [080101003]

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK 80
2. UNIT GINNA #1
3. CUSTOMER: ROCHESTER GCE
4. LP# 2
5. LOCATION GOV
6. DISC# 2
7. TEST NO. TD15001

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TD
   (MIN. Y.S. [110.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3.	Y.S. (KSI)	127.000
4.	U.T.S. (KSI)	140.500
5.	ELONGATION	20.0
6.	R.A.	58.9
7.	FATT (DEG.F)	-75.0
8.	R.T. IMPACT(FT.LB.)	67.0
9.	U.S. IMPACT TEMP. (DEG.F)	75.0
10.	U.S. IMPACT ENG. (FT.LB.)	67.0
11.	U.S. KIC (KSI*SQRT(IN.))	196.25

C. MATERIAL PROPERTIES (RIM) b,c,e

1.	Y.S. (KSI)	129.00
2.	U.T.S. (KSI)	141.00
3.	ELONGATION	19..
4.	R.A.	64..
5.	FATT (DEG.F)	-75.0
6.	R.T. IMPACT(FT.LB.)	67..
7.	U.S. IMPACT TEMP. (DEG.F)	75..
8.	U.S. IMPACT ENG. (FT.LB.)	67..
9.	U.S. KIC (KSI*SQRT(IN.))	197.6.

D. CHEMISTRY (each bracket marked b,c,e)

C	MN	SI	P	CR	MO	V
[.21]	[.27]	[.17]	[.010]	[1.74]	[.45]	[.12]

NI	AS	SB	SN	AL	CU	S
[4.07]	[ ]	[ ]	[ ]	[ ]	[ ]	[.008]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	52.900
2. 2160 (120%)	(KSI)	60.000

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.) [4.51]
2. A-CR-OS (OVERSPEED) (IN.) [3.42]

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	274
2. ESTIMATED MAX DA/DT (IN/HR)	.190-004
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	1.160"
5. CALCULATED A/Acr RATIO	.339

March 19, 1980
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ID # : [D380101003]

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GOV
6. DISC	3
7. TEST NO.	TD14999

B. MATERIAL PROPERTIES (HUB)

1. TYPE (MIN. Y.S. [110.0] TO (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL

3. Y.S. (KSI)	116.000
4. U.T.S. (KSI)	130.000
5. ELONGATION	21.8
6. R.A.	65.2
7. FATT (DEG.F)	-115.0
8. R.T. IMPACT(FT.LB.)	70.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	70.5
11. U.S. KIC (KSI*SQRT(IN.))	193.72

C. MATERIAL PROPERTIES (RIM)

1. Y.S. (KSI)	117.50[illegible]
2. U.T.S. (KSI)	130.50[illegible]
3. ELONGATION	21.[illegible]
4. R.A.	67.[illegible]
5. FATT (DEG.F)	-115.[illegible]
6. R.T. IMPACT(FT.LB.)	74.[illegible]
7. U.S. IMPACT TEMP. (DEG.F)	0.[illegible]
8. U.S. IMPACT ENG. (FT.LB.)	74.[illegible]
9. U.S. KIC (KSI*SQRT(IN.))	200.7[illegible]

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
.25	.24	.17	.009	1.58	.43	.11

NI	AS	SB	SN	AL	CU	S
3.40						.011

E. BORE STRESS

SPEED (RPM)		STRESS
1. 1800	(KSI)	52.400
2. 2160 (120%)	(KSI)	59.700

F. CRACK DATA

1. A-CR-OP (1800 RPM) (IN.)	4.47
2. A-CR-OS (OVERSPEED) (IN.)	3.36

G. SERVICE DATA

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	223
2. ESTIMATED MAX DA/DT (IN/HR)	.673-005
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	.4112"
5. CALCULATED A/Acr RATIO	.122

b,c,e

ID # : [D080101003]

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GOV
6. DISC#	4
7. TEST NO.	TD15007

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE (MIN. Y.S. [100.0] (KSI))	TC
2. SUPPLIER:	MIDVALE HEPPENSTALL
3. Y.S. (KSI)	112.500
4. U.T.S. (KSI)	127.500
5. ELONGATION	22.0
6. R.A.	67.0
7. FATT (DEG.F)	-105.0
8. R.T. IMPACT(FT.LB.)	88.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	88.0
11. U.S. KIC (KSI*SQRT(IN.))	215.26

b,c,e

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	114.0!0
2. U.T.S. (KSI)	130.5('0
3. ELONGATION	21 0
4. R.A.	67 3
5. FATT (DEG.F)	-105 0
6. R.T. IMPACT(FT.LB.)	76 5
7. U.S. IMPACT TEMP. (DEG.F)	-50 0
8. U.S. IMPACT ENG. (FT.LB.)	76 5
9. U.S. KIC (KSI*SQRT(IN.))	200. 9

D. CHEMISTRY (each value marked b,c,e)

C	MN	SI	P	CR	MO	V
.26	.28	.32	.008	1.54	.43	.12

NI	AS	SB	SN	AL	CU	S
3.6						.007

E. BORE STRESS b,c,e

SPEED (RPM)		STRESS
1. 1800	(KSI)	49.600
2. 2160 (120%)	(KSI)	58.200

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	6.31
2. A-CR-OS (OVERSPEED) (IN.)	4.48

G. SERVICE DATA b,c,e

1. PER. TEMP. METAL TEMP. HUB (DEG.F)	188
2. ESTIMATED MAX DA/DT (IN/HR)	.300-005
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	.183"
5. CALCULATED A/Acr RATIO	.040

ID # : [D080101003] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GOV
6. DISC#	5
7. TEST NO.	TD14991

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TC
   (MIN. Y.S. [100.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL

b,c,e

3. Y.S. (KSI)	109.000
4. U.T.S. (KSI)	121.000
5. ELONGATION	23.2
6. R.A.	65.4
7. FATT (DEG.F)	-80.0
8. R.T. IMPACT(FT.LB.)	111.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	111.5
11. U.S. KIC (KSI*SQRT(IN.))	240.41

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	112.00[illegible]
2. U.T.S. (KSI)	125.50[illegible]
3. ELONGATION	24.[illegible]
4. R.A.	67.[illegible]
5. FATT (DEG.F)	-80.[illegible]
6. R.T. IMPACT(FT.LB.)	96.[illegible]
7. U.S. IMPACT TEMP. (DEG.F)	-50.[illegible]
8. U.S. IMPACT ENG. (FT.LB.)	96.[illegible]
9. U.S. KIC (KSI*SQRT(IN.))	225.0[illegible]

D. CHEMISTRY (each value marked b,c,e)

C	MN	SI	P	CR	MO	V
.24	.26	.25	.008	1.76	.44	.12

NI	AS	SB	SN	AL	CU	S
3.47						.007

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	50.500
2. 2160 (120%)	(KSI)	58.400

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	7.67
2. A-CR-OS (OVERSPEED) (IN.)	5.64

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	178
2. ESTIMATED MAX DA/DT (IN/HR)	.234-005
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	.143"
5. CALCULATED A/Acr RATIO	.025

[illegible]

b,c,e

ID # :[D080101003]

LP TURBINE DISC INFORMATION

b,c,e

A. UNIT IDENTIFICATION

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GOV
6. DISC#	6
7. TEST NO.	TD14989

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TB
   (MIN. Y.S. [90.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	98.500
4. U.T.S. (KSI)	113.500
5. ELONGATION	23.0
6. R.A.	66.2
7. FATT (DEG.F)	-105.0
8. R.T. IMPACT(FT.LB.)	96.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	96.0
11. U.S. KIC (KSI*SQRT(IN.))	211.79

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	95.000
2. U.T.S. (KSI)	111.000
3. ELONGATION	24.0
4. R.A.	72.
5. FATT (DEG.F)	-105.0
6. R.T. IMPACT(FT.LB.)	105.5
7. U.S. IMPACT TEMP. (DEG.F)	-75.0
8. U.S. IMPACT ENG. (FT.LB.)	105.5
9. U.S. KIC (KSI*SQRT(IN.))	218.76

D. CHEMISTRY (each bracket annotated b,c,e)

C	MN	SI	P	CR	MO	V
[.21]	[.27]	[.17]	[.010]	[1.74]	[.45]	[.12]

NI	AS	SB	SN	AL	CU	S
[4.07]	[ ]	[ ]	[ ]	[ ]	[ ]	[.008]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	43.500
2. 2160 (120%)	(KSI)	49.500

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	8.04
2. A-CR-OS (OVERSPEED) (IN.)	6.12

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	203
2. ESTIMATED MAX DA/DT (IN/HR)	.429-005
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	zero
5. CALCULATED A/Acr RATIO	0/6.12

ID # : [D080101004] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK		80
2. UNIT	GINNA #1	
3. CUSTOMER:	ROCHESTER	GCE
4. LP#		2
5. LOCATION		GEN
6. DISC#		1
7. TEST NO.	TD3749	

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TB (MIN. Y.S. [90.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	103.000
4. U.T.S. (KSI)	117.000
5. ELONGATION	22.0
6. R.A.	65.0
7. FATT (DEG.F)	-120.0
8. R.T. IMPACT(FT.LB.)	90.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	90.0
11. U.S. KIC (KSI*SQRT(IN.))	209.04

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	98.0[illegible]
2. U.T.S. (KSI)	115.0[illegible]
3. ELONGATION	23.[illegible]
4. R.A.	70.[illegible]
5. FATT (DEG.F)	-120.[illegible]
6. R.T. IMPACT(FT.LB.)	88.[illegible]
7. U.S. IMPACT TEMP. (DEG.F)	-75.[illegible]
8. U.S. IMPACT ENG. (FT.LB.)	88.[illegible]
9. U.S. KIC (KSI*SQRT(IN.))	201.7[illegible]

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[.28] b,c,e	[.32] b,c,e	[.29] b,c,e	[.009] b,c,e	[1.73] b,c,e	[.44] b,c,e	[.15] b,c,e

NI	AS	SB	SN	AL	CU	S
[3.47] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[.009] b,c,e

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	50.000
2. 2160 (120%)	(KSI)	56.300

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	5.83
2. A-CR-OS (OVERSPEED) (IN.)	4.52

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	378
2. ESTIMATED MAX DA/DT (IN/HR)	.1075-003
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	zero
5. CALCULATED A/Acr RATIO	0/4.52

ID # : [D080101004] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK		80
2. UNIT	GINNA #1	
3. CUSTOMER:	ROCHESTER	GLE
4. LP#		2
5. LOCATION		GEN
6. DISC#		2
7. TEST NO.	TD15000	

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE (MIN. Y.S. [110.0] (KSI)) TD
2. SUPPLIER: MIDVALE HEPPENSTALL

b,c,e

3. Y.S. (KSI)	122.500
4. U.T.S. (KSI)	134.000
5. ELONGATION	19.4
6. R.A.	60.6
7. FATT (DEG.F)	-82.5
8. R.T. IMPACT(FT.LB.)	80.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	80.5
11. U.S. KIC (KSI*SQRT(IN.))	213.44

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	119.50
2. U.T.S. (KSI)	132.00
3. ELONGATION	21.
4. R.A.	66.
5. FATT (DEG.F)	-82.
6. R.T. IMPACT(FT.LB.)	86.
7. U.S. IMPACT TEMP. (DEG.F)	0.
8. U.S. IMPACT ENG. (FT.LB.)	86.
9. U.S. KIC (KSI*SQRT(IN.))	218.6

D. CHEMISTRY (each value bracketed, b,c,e)

C	MN	SI	P	CR	MO	V
.21	.27	.17	.010	1.74	.45	.12

NI	AS	SB	SN	AL	CU	S
4.07						.008

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	52.900
2. 2160 (120%)	(KSI)	60.000

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	5.40
2. A-CR-OS (OVERSPEED) (IN.)	4.11

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	274
2. ESTIMATED MAX DA/DT (IN/HR)	.190-004
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	1.160"
5. CALCULATED A/Acr RATIO	.282

b,c,e

ID # : [C080101004]

LP TURBINE DISC INFORMATION

b,c,e

A. UNIT IDENTIFICATION

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GEN
6. DISC#	3
7. TEST NO.	TD14998

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE	TD
(MIN. Y.S. [110.0] (KSI))	
2. SUPPLIER:	MIDVALE HEPPENSTALL
3. Y.S. (KSI)	115.000
4. U.T.S. (KSI)	129.500
5. ELONGATION	20.4
6. R.A.	63.5
7. FATT (DEG.F)	-110.0
8. R.T. IMPACT(FT.LB.)	72.5
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	72.5
11. U.S. KIC (KSI*SQRT(IN.))	195.91

b,c,e

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	116.000
2. U.T.S. (KSI)	131.000
3. ELONGATION	21.2
4. R.A.	67.5
5. FATT (DEG.F)	-110.0
6. R.T. IMPACT(FT.LB.)	69.0
7. U.S. IMPACT TEMP. (DEG.F)	-75.0
8. U.S. IMPACT ENG. (FT.LB.)	69.0
9. U.S. KIC (KSI*SQRT(IN.))	191.46

D. CHEMISTRY (each value marked b,c,e)

C	MN	SI	P	CR	MO	V
.25	.24	.17	.009	1.58	.43	.11

NI	AS	SB	SN	AL	CU	S
3.40						.011

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	52.400
2. 2160 (120%)	(KSI)	59.700

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	4.58
2. A-CR-OS (OVERSPEED) (IN.)	3.44

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	223
2. ESTIMATED MAX DA/DT (IN/HR)	.673-005
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	.4112"
5. CALCULATED A/Acr RATIO	.1195

ID # : [D/80101004] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GEN
6. DISC#	4
7. TEST NO.	TD15004

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TC (MIN. Y.S. [100.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL

b,c,e

3. Y.S. (KSI)	110.000
4. U.T.S. (KSI)	122.500
5. ELONGATION	21.8
6. R.A.	67.0
7. FATT (DEG.F)	-80.0
8. R.T. IMPACT(FT.LB.)	86.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	86.0
11. U.S. KIC (KSI*SQRT(IN.))	210.42

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	107.50[
2. U.T.S. (KSI)	118.50[
3. ELONGATION	22.[
4. R.A.	68.5
5. FATT (DEG.F)	-80.[
6. R.T. IMPACT(FT.LB.)	86.[
7. U.S. IMPACT TEMP. (DEG.F)	75.[
8. U.S. IMPACT ENG. (FT.LB.)	86.[
9. U.S. KIC (KSI*SQRT(IN.))	208.17

D. CHEMISTRY

C	MN	SI	P	CR	MO	V
[.27] b,c,e	[.30] b,c,e	[.18] b,c,e	[.008] b,c,e	[1.72] b,c,e	[.45] b,c,e	[.12] b,c,e

NI	AS	SB	SN	AL	CU	S
[3.38] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[ ] b,c,e	[.009] b,c,e

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	49.600
2. 2160 (120%)	(KSI)	58.200

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	6.01
2. A-CR-OS (OVERSPEED) (IN.)	4.26

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	188
2. ESTIMATED MAX DA/DT (IN/HR)	.300-005
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	.183"
5. CALCULATED A/Acr RATIO	.0429

March 19, 1980 — Attachment A — Appendix I — Sheet 26

ID # : [0080101004] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	[80]
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GEN
6. DISC#	5
7. TEST NO.	TD14993

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE (MIN. Y.S. [100.0] (KSI)) TC
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	118.000
4. U.T.S. (KSI)	137.000
5. ELONGATION	19.0
6. R.A.	57.3
7. FATT (DEG.F)	-97.5
8. R.T. IMPACT(FT.LB.)	65.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	65.0
11. U.S. KIC (KSI*SQRT(IN.))	186.73

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	121..30
2. U.T.S. (KSI)	138..00
3. ELONGATION	21..5
4. R.A.	60.1
5. FATT (DEG.F)	-9..5
6. R.T. IMPACT(FT.LB.)	58.5
7. U.S. IMPACT TEMP. (DEG.F)	-50.0
8. U.S. IMPACT ENG. (FT.LB.)	58.5
9. U.S. KIC (KSI*SQRT(IN.))	178.46

D. CHEMISTRY (each b,c,e)

C	MN	SI	P	CR	MO	V
[.29]	[.29]	[.10]	[.008]	[1.66]	[.44]	[.12]

NI	AS	SB	SN	AL	CU	S
[3.23]	[ ]	[ ]	[ ]	[ ]	[ ]	[.008]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	50.500
2. 2160 (120%)	(KSI)	58.400

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	4.48
2. A-CR-OS (OVERSPEED) (IN.)	3.25

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	178
2. ESTIMATED MAX DA/DT (IN/HR)	.234-005
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	.143"
5. CALCULATED A/Acr RATIO	.044

March 19, 1980 — Attachment A — Appendix I — Sheet 27

ID # : [DJ80101004] b,c,e

LP TURBINE DISC INFORMATION

A. UNIT IDENTIFICATION b,c,e

1. BUILDING BLOCK	80
2. UNIT	GINNA #1
3. CUSTOMER:	ROCHESTER G&E
4. LP#	2
5. LOCATION	GEN
6. DISC#	6
7. TEST NO.	T032484

B. MATERIAL PROPERTIES (HUB) b,c,e

1. TYPE TD
   (MIN. Y.S. [110.0] (KSI))
2. SUPPLIER: MIDVALE HEPPENSTALL b,c,e

3. Y.S. (KSI)	111.000
4. U.T.S. (KSI)	126.000
5. ELONGATION	23.4
6. R.A.	69.7
7. FATT (DEG.F)	-120.0
8. R.T. IMPACT(FT.LB.)	100.0
9. U.S. IMPACT TEMP. (DEG.F)	75.0
10. U.S. IMPACT ENG. (FT.LB.)	100.0
11. U.S. KIC (KSI*SQRT(IN.))	228.95

C. MATERIAL PROPERTIES (RIM) b,c,e

1. Y.S. (KSI)	115.000
2. U.T.S. (KSI)	129.500
3. ELONGATION	22.6
4. R.A.	68.2
5. FATT (DEG.F)	-120.0
6. R.T. IMPACT(FT.LB.)	96.0
7. U.S. IMPACT TEMP. (DEG.F)	-50.0
8. U.S. IMPACT ENG. (FT.LB.)	96.0
9. U.S. KIC (KSI*SQRT(IN.))	227.80

D. CHEMISTRY (each value marked b,c,e)

C	MN	SI	P	CR	MO	V
[.26]	[.28]	[.02]	[.007]	[1.87]	[.44]	[.14]

NI	AS	SB	SN	AL	CU	S
[3.53]	[ ]	[ ]	[ ]	[ ]	[ ]	[.006]

E. BORE STRESS b,c,e

SPEED (RPM)	STRESS	
1. 1800	(KSI)	43.500
2. 2160 (120%)	(KSI)	49.500

F. CRACK DATA b,c,e

1. A-CR-OP (1800 RPM) (IN.)	9.46
2. A-CR-OS (OVERSPEED) (IN.)	7.22

G. SERVICE DATA b,c,e

1. OPER. TEMP. METAL TEMP. HUB (DEG.F)	203
2. ESTIMATED MAX DA/DT (IN/HR)	.429-005
3. ROTOR OPERATING HOURS	61,103.25
4. CALCULATED CRACK DEPTH	zero
5. CALCULATED A/Acr RATIO	0/7.22

Appendix II

[illegible]

CHART I

TYPICAL 1977 BLOWDOWN CHEMISTRY

RESULTS	PARAMETER	WESTINGHOUSE CONTROL
0.4-0.7μMHOS	Cation Conductivity	< 2.0μMHOS
1.5-3.5μMHOS	Conductivity	None
(-)0.15-0.05ppm	Free Hydroxide	< .15ppm
< 0.05-0.10ppm	Chloride	None
7-15ppm	Sodium	None
8.6-9.1	Ph	8.5-9.2

CHART II

CONDENSER COOLING WATER CHEMISTRY

PARAMETER	NORMAL RANGE
PH	7.5-9.0
Total Hardness	100-175ppm
Alkalinity	50-125ppm
Silica	0.1-1.0ppm
Sodium Sulfate	20-45ppm
Sodium	10-25ppm
Calcium	30-50ppm
Magnesium	5-10ppm
Chlorides	15-40ppm
Total Solids	150-250ppm
Total Dissolved Solids	150-250ppm
Suspended Solids	5-20ppm

CHART III

TYPICAL 1979 BLOWDOWN CHEMISTRY

RESULTS	PARAMETER	WESTINGHOUSE CONTROL
0.15-0.25μMHOS	Cation Conductivity	< 2.0μMHOS
1.2-1.8	Conductivity	None
(-)0.15-0.05ppm	Free Hydroxide	< .15ppm
0.005-0.015ppm	Chloride	< .15ppm
0.005-0.015ppm	Sodium	< .10ppm
8.5-9.0	PH	8.5-9.2

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